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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/876,522	06/07/2001	Charles Cohn	COHN 9	9236

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HITT GAINES & BOISBRUN P.C.
P.O. BOX 832570
RICHARDSON, TX 75083

EXAMINER

MUTSCHLER, BRIAN L

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 03/03/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/876,522

Applicant(s)

COHN, CHARLES

Examiner

Brian L. Mutschler

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 21-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 21-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Comments

1. Applicant's cancellation of claims 15-20 is acknowledged.
2. The objection to the specification, including the title, has been overcome by Applicant's amendment.
3. The rejection of claims 1-14 under 35 U.S.C. 102(b) and 35 U.S.C. 103 over Gulla and Bhatt et al. has been overcome by Applicant's amendment. While these references both teach methods for creating interconnects on printed wiring boards, neither Gulla nor Bhatt et al. teach the formation of plating layers on dielectric layers, as recited in amended claims 1 and 8. Therefore, the rejections set forth in the previous Office action have been withdrawn.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
5. Claims 1-14 and 21-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the first and second openings" in line 8. There is insufficient antecedent basis for this limitation in the claim. The phrase also occurs in claim 8 at line 12, in claim 22 at line 3, and in claim 24 at line 3. It is suggested that the

phrase be changed to --the openings--, which is supported in the independent claims.

The same applies to dependent claims 2-7, 9-14, 21 and 23.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-14 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim (US 2001/0004489 A1) in view of Stern (U.S. Pat. No. 6,015,482).

Due to the use of similar terminology describing different structural features, the equivalent term used in the claims will be identified below in the explanation or included in parentheses.

Lim discloses a method for making printed circuit boards (printed wiring boards) comprising a core dielectric **94** having holes (vias) **101a** and **101b** formed therein (fig. 6B; par. [0027]). Metal interconnects comprising metallized layers **97** and **99** as well as interconnects **102** and **104** are formed on either side of the substrate **94**, including through the holes **101a** and **101b** (fig. 6B-6E). Dielectric layers **106** and **108** are formed on either side of the substrate **94**, and the dielectric layers **106** and **108** having openings corresponding to the interconnects **102** and **104** (fig. 6F). Layers of copper (plating layers) **110** and **112** are formed on the dielectric layers **106** and **108** (fig. 6G).

Third and fourth metallized layers (conductive layers) **114** and **116** are formed by electroplating the layers on the copper layers (plating layers) **110** and **112** (fig. 6G-6H; par. [0027]). After forming the metallized layers (conductive layers) **114** and **116**, the remainder of the copper layers (plating layers) **110** and **112** are removed (fig. 6H; par. [0027]).

Regarding claims 2 and 9, the copper layers (plating layers) **110** and **112** would necessarily be formed with an electro-less process because they are formed on a dielectric, which by definition would not be conductive, thus incapable of electroplating the plating layers. The third and fourth metallized layers (conductive layers) are formed by electroplating (par. [0027]).

Regarding claims 5 and 12, the copper layers (plating layers) **110** and **112** are partially removed, resulting in discontinuous plating layers (fig. 6H).

Regarding claim 8, Lim teaches, "For additional layers, the steps in **FIG. 6C** to **FIG. 6H** can be repeated" (par. [0027]).

Regarding claims 21 and 23, the copper layers (plating layers) **110** and **112** are not formed in the via (fig. 6G).

Regarding claims 22 and 24, the third and fourth metallization layers **1114** and **116** are formed in a desired pattern including the area substantially within the openings in the dielectric layers **16** and **108** (fig. 6H).

The method disclosed by Lim differs from the instant invention because Lim does not teach the following:

- a. Forming first and second contact layers over portions of the plating layers using the plating layers, as recited in claims 1 and 8;
- b. Electroplating first and second contact layers includes electroplating first and second barrier layers over the plating layers, as recited in claims 3 and 10;
- c. Electroplating the barrier layers includes electroplating first and second nickel layers and further electroplating first and second gold layers on the first and second nickel layers, as recited in claims 4 and 11;
- d. Removing a portion of the plating layers includes removing a portion of the first plating layer prior to electroplating the first and second contact layers, as recited in claims 6 and 13; and
- e. Removing a portion of the plating layers includes removing a portion of the second plating layers subsequent to electroplating the contact layers, as recited in claims 7 and 14.

Stern discloses a method for fabricating contacts on printed circuits wherein contacts are formed on copper patterns. The contacts are formed by electroplating nickel on a copper pattern, followed by electroplating gold on the nickel (col. 3, lines 8-21). Stern teaches, "Electroplating of nickel is required to prevent 'migration' of copper into the electroplated gold...[because] copper reduces the anti-corrosive properties of gold, which is essential to the integrity of printed circuit contacts" (col. 3, lines 12-21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Lim to form gold contacts on the

plating layers as taught by Stern because gold contacts are anti-corrosive, which Stern teaches "is essential to the integrity of printed circuit boards" (col. 3, lines 17-21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Lim to include a step of fabricating a barrier layer made of nickel as taught by Stern because the electroplating of nickel prevents the migration of copper into gold contacts and protects the anticorrosive properties of gold.

Regarding claims 6, 7, 13 and 14, the order in which the contact layers are plated and the plating layers are removed is not critical to the process. Removal of the plating layer before or after the plating of the contact layers does not affect the requisite steps in plating the contact layers because a portion of the plating layers and the conductive layers is present to create a current path for the electroplating process. Lim teaches the removal of portions of the plating layer following the patterned plating of the conductive layers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Lim to remove portions of the plating layers either before or after the plating of the contact layers because the selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. See *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

Response to Arguments

8. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Pat. No. 4,789,648 issued to Chow et al. discloses a similar contact structure using dielectric layers separating metal interconnect layers.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703)

Art Unit: 1753

305-0180. The examiner can normally be reached on Monday-Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in black ink, appearing to read 'Nam Nguyen', is positioned above the printed name.

NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

blm
February 25, 2003